



HEAVY RAINFALL FORECASTING

JOE RUA

LEAD FORECASTER

NWS LAKE CHARLES

WE WILL LOOK AT....

PRECIPITATION FREQUENCY

FORECASTING TOOLS

FORECASTING TECHNIQUES

NWS PRODUCTS

DISSEMINATION

PRECIPITATION FREQUENCY

**Rainfall Frequency Atlas -
U.S. Weather Bureau Technical Paper 40
(Hershfield 1961)**

**NOAA Technical Memorandum NWS Hydro 35 –
Updated 5 to 60 minute Precipitation Frequency
(1977)**

**Rainfall Frequency/Magnitude Atlas for the South Central
United States –
Updated 3, 6, 12, and 24 hour Precipitation Frequency
(Faiers, Keim, and Muller NOAA Southern Regional
Climate Center 1997)**

LET'S LOOK AT AN EXAMPLE

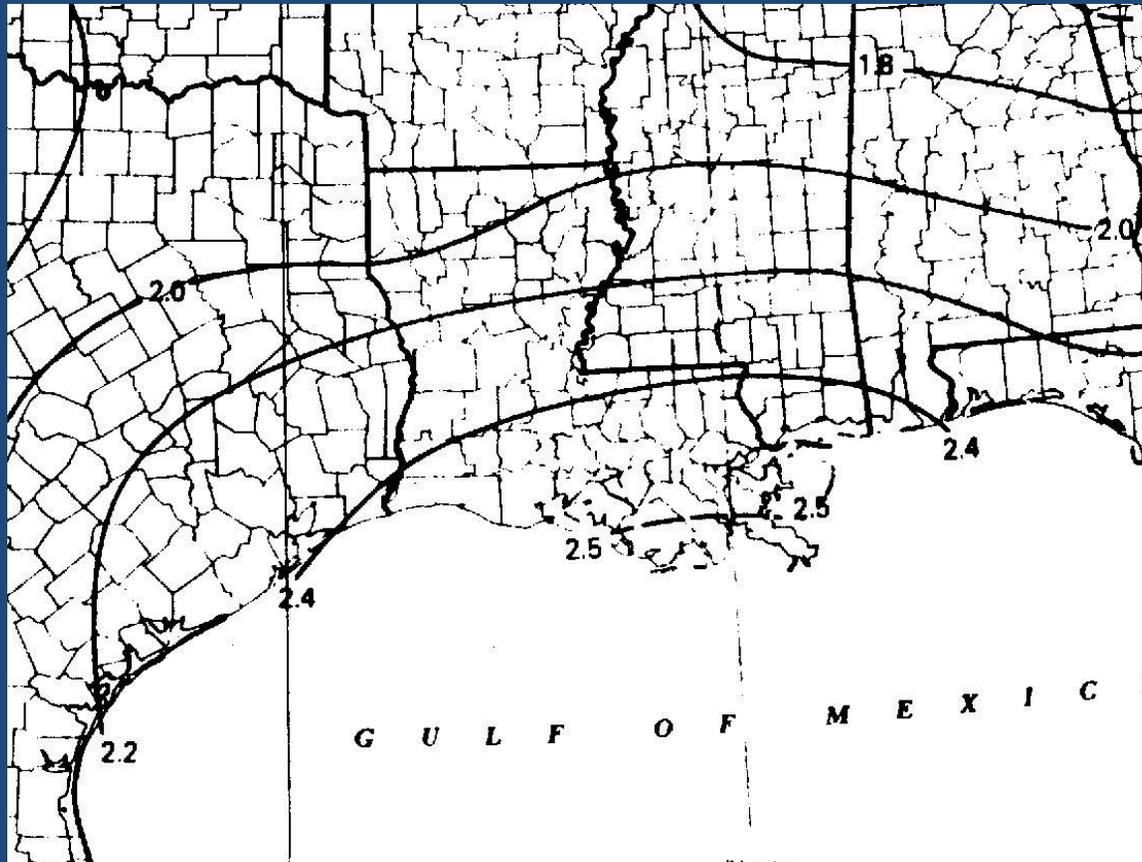
On Thursday May 22nd, 2008 ...

5.07 inches of rainfall at Lafayette Airport

6 hour...5.03 inches...3:30 pm to 9:30 pm

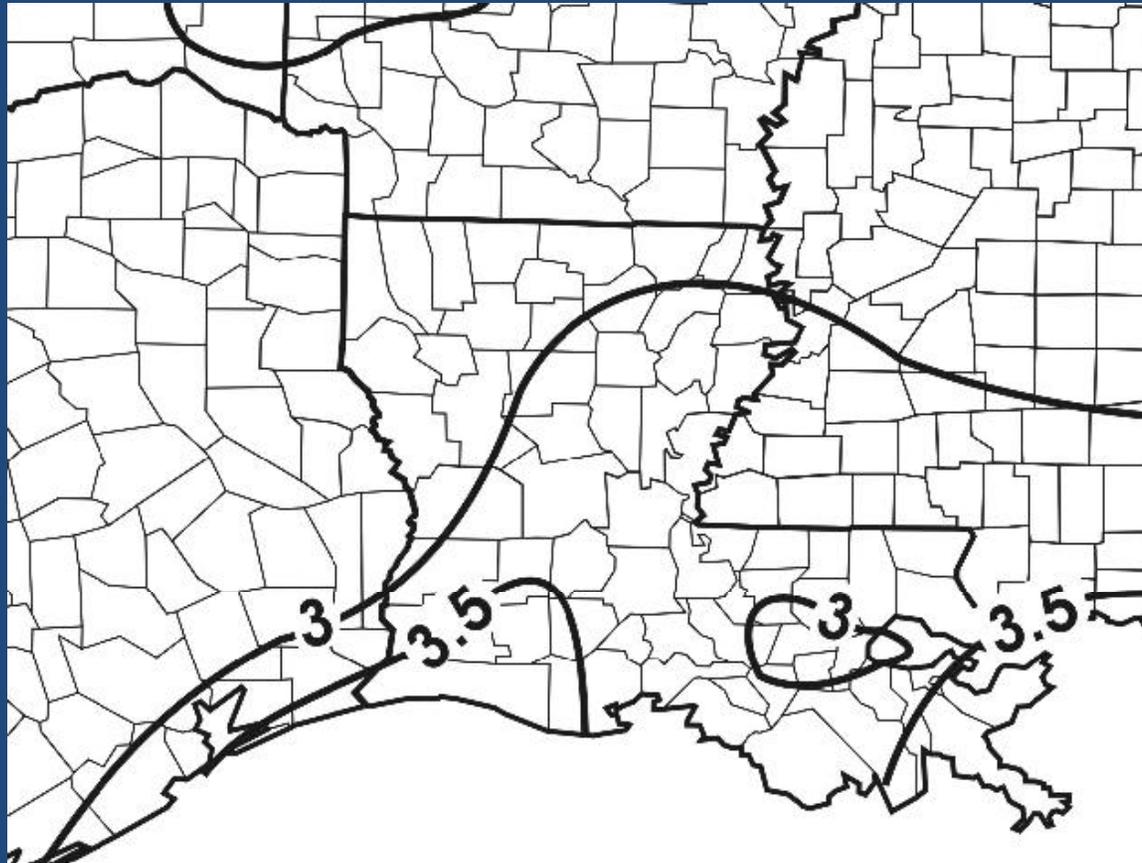
3 hour...4.83 inches...4:00 pm to 7:00 pm

1 hour...2.36 inches...5:00 pm to 6:00 pm



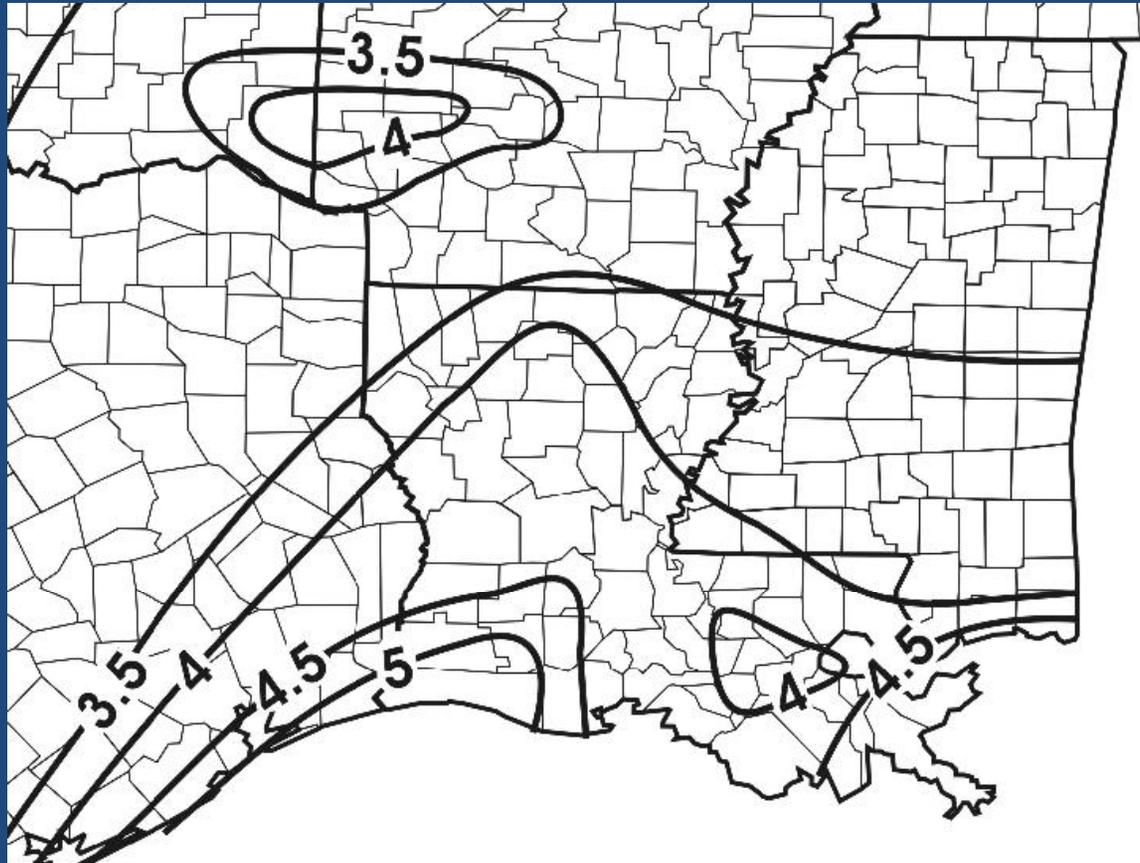
2 Year 1 Hour Frequency

2.36 Inches approached 2 Year Event



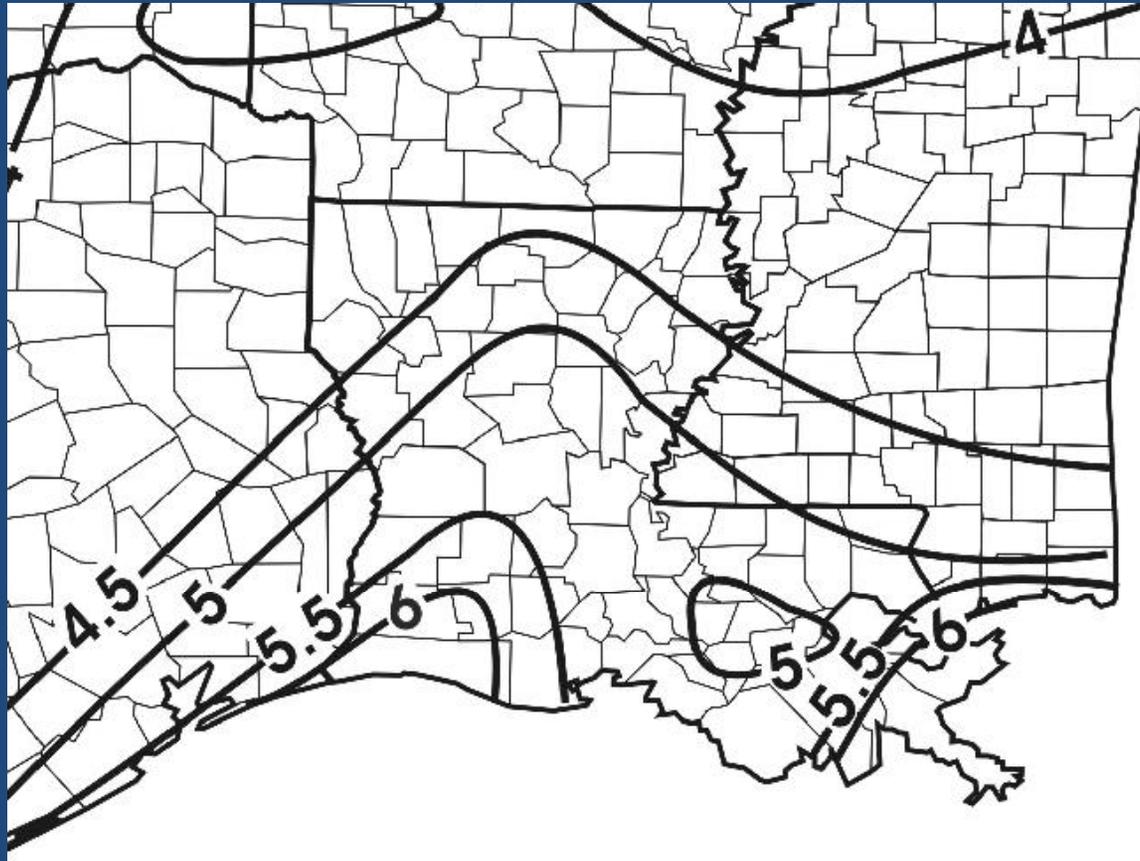
2 Year 3 Hour Frequency

4.83 Inches **Exceeded** 2 Year Event



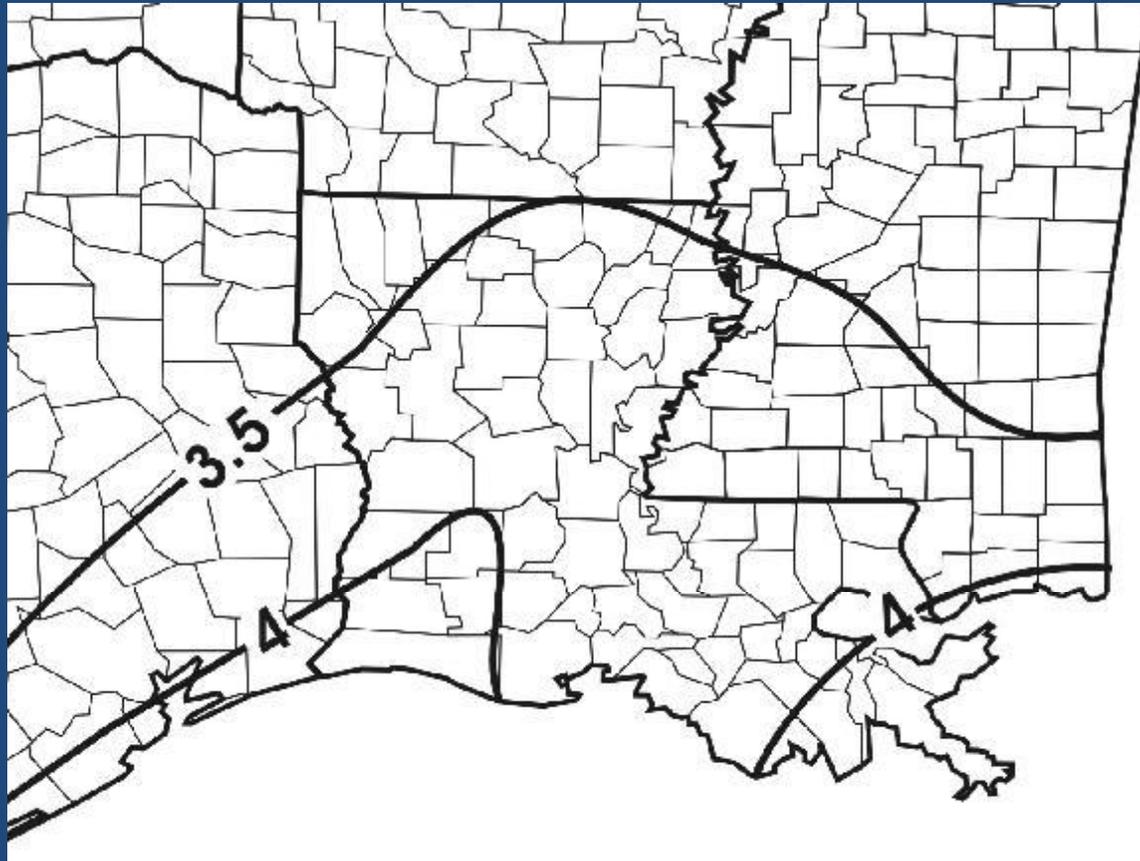
5 Year 3 Hour Frequency

4.83 Inches **Exceeded** 5 Year Event



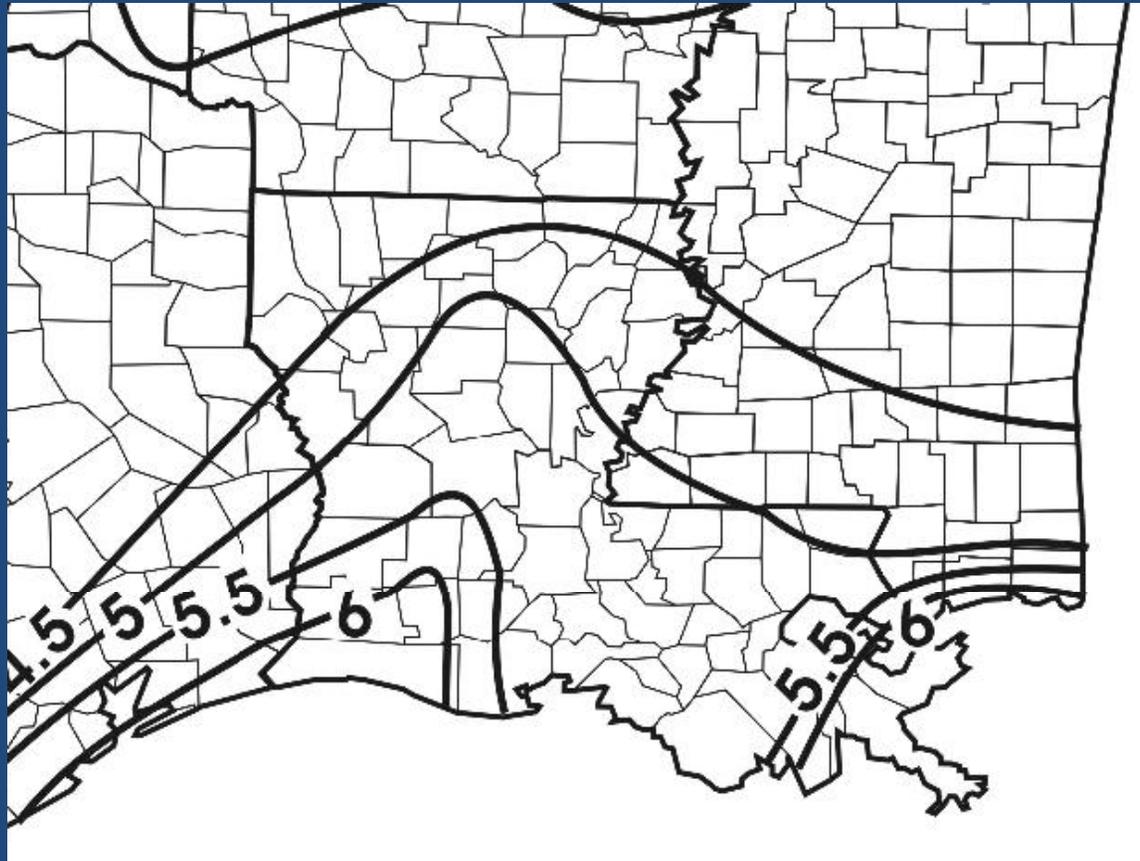
10 Year 3 Hour Frequency

4.83 Inches was **Below** 10 Year Event



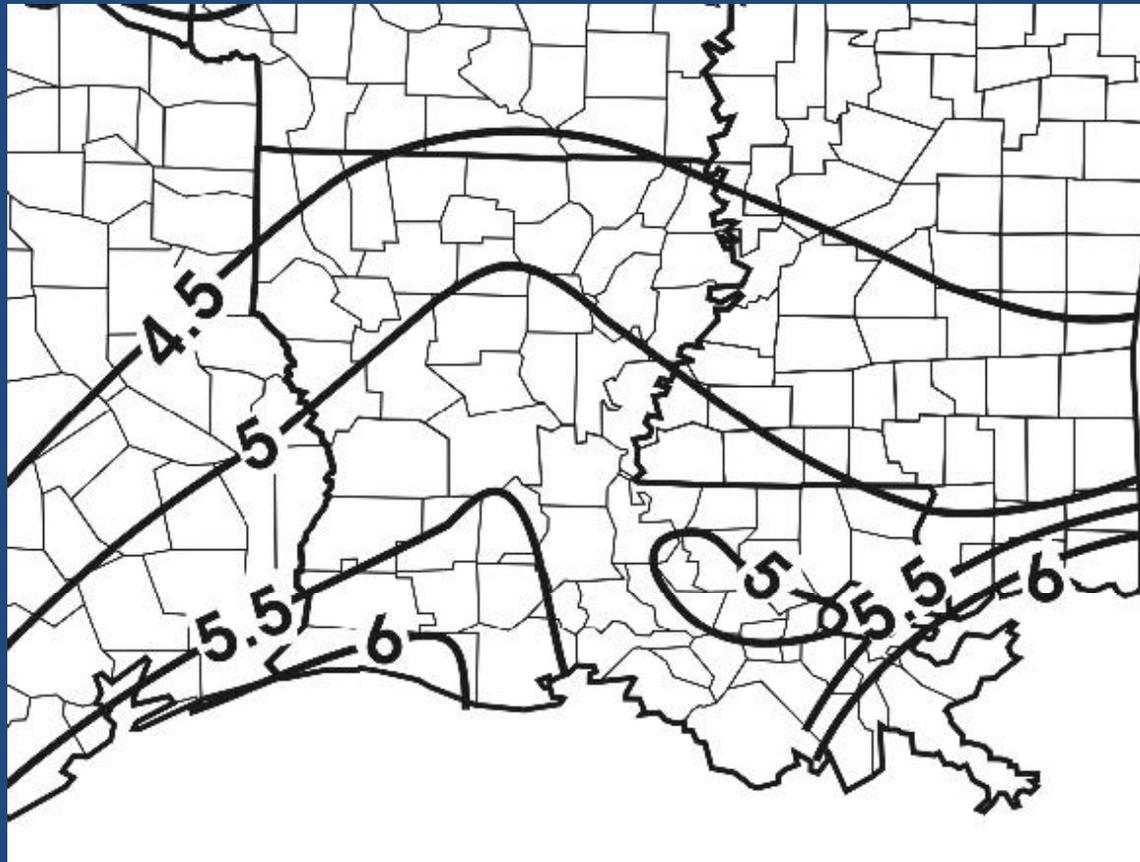
2 Year 6 Hour Frequency

5.03 Inches **Exceeded** 2 Year Event



5 Year 6 Hour Frequency

5.03 Inches Near 5 Year Event



2 Year 24 Hour Frequency

5.07 Inches Near 2 Year Event

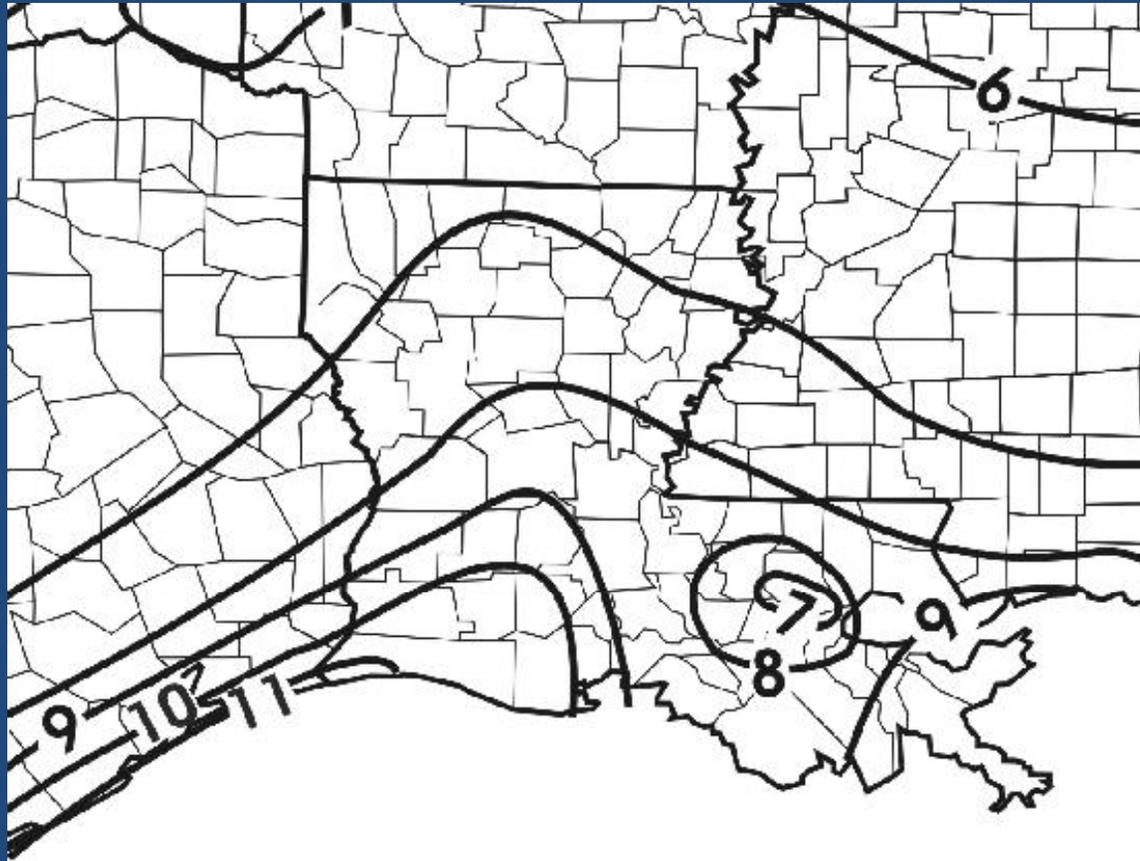
IN SUMMARY...

Heavy Rainfall Events...

Like the one on May 22nd ...

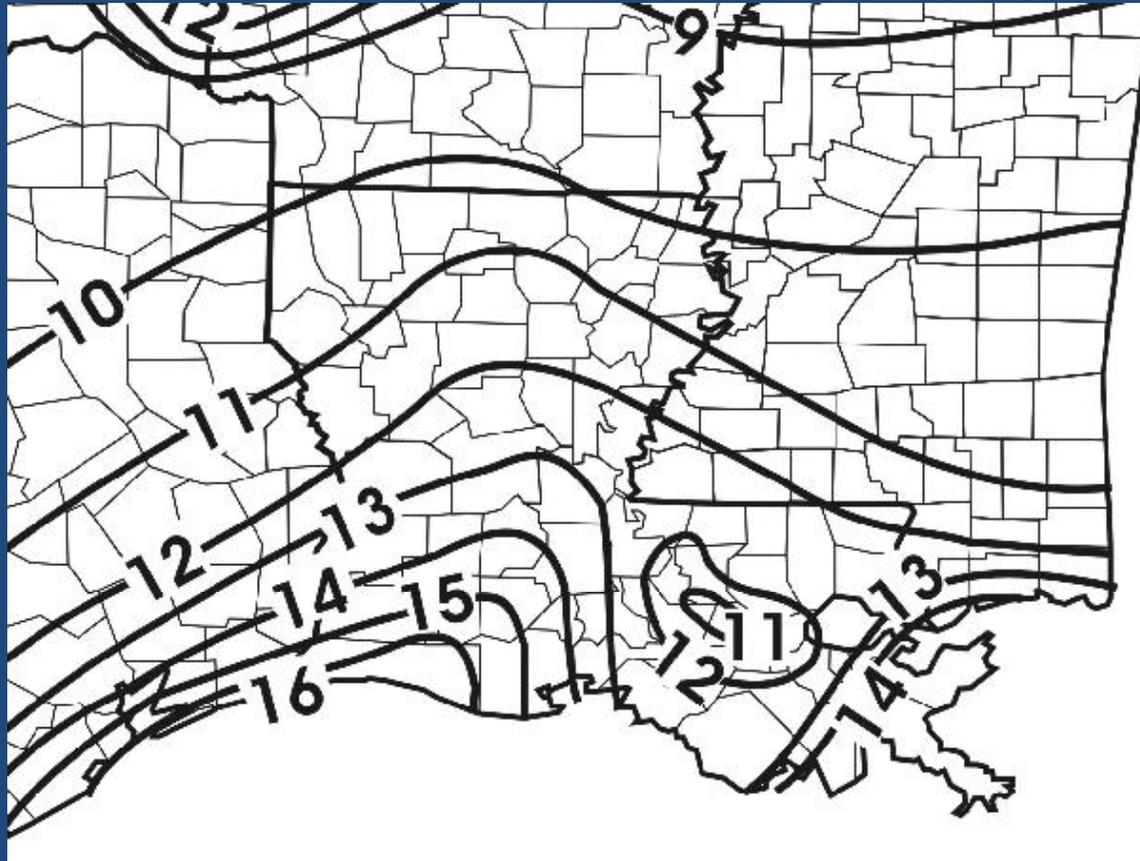
are NOT Uncommon to the

Bayou Vermilion River Basin.



100 Year 3 Hour Frequency

Around **9 Inches** would be a **Rare Event**



100 Year 24 Hour Frequency
Around **14 Inches** would be a **Rare Event**

FORECASTING TOOLS

UPPER AIR RADIOSONDE DATA

(WEATHER BALLOON)



RADIOSONDE



TIME FOR LAUNCH



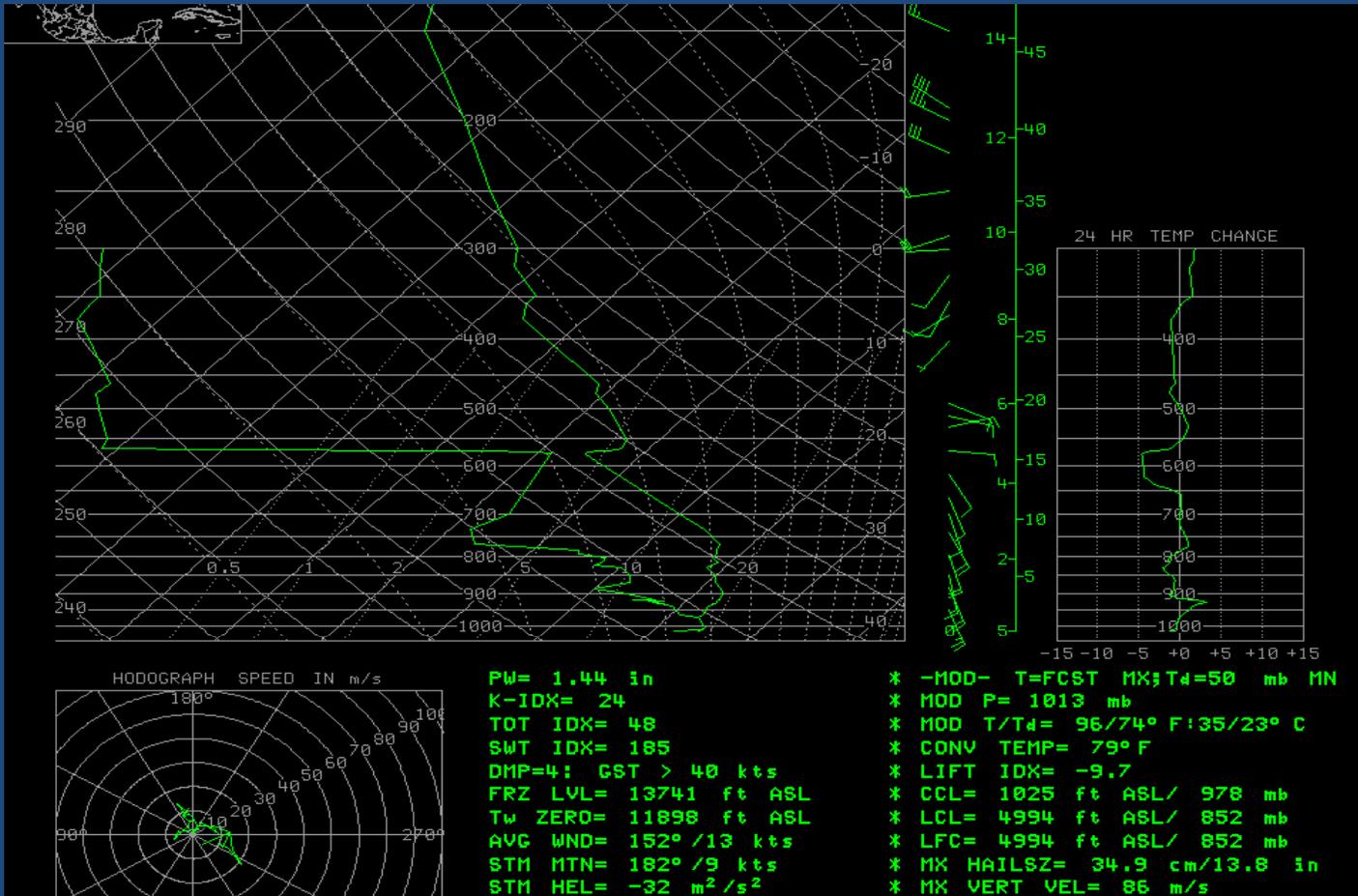
RELEASE



GOING ON UP

RADIOSONDE DATA

- **USED IN COMPUTER MODELS**
- **UPPER AIR ANALYSIS (FIND JET STREAM, TROUGHS, RIDGES)**
- **MOISTURE PROFILE (SKEW-T)**

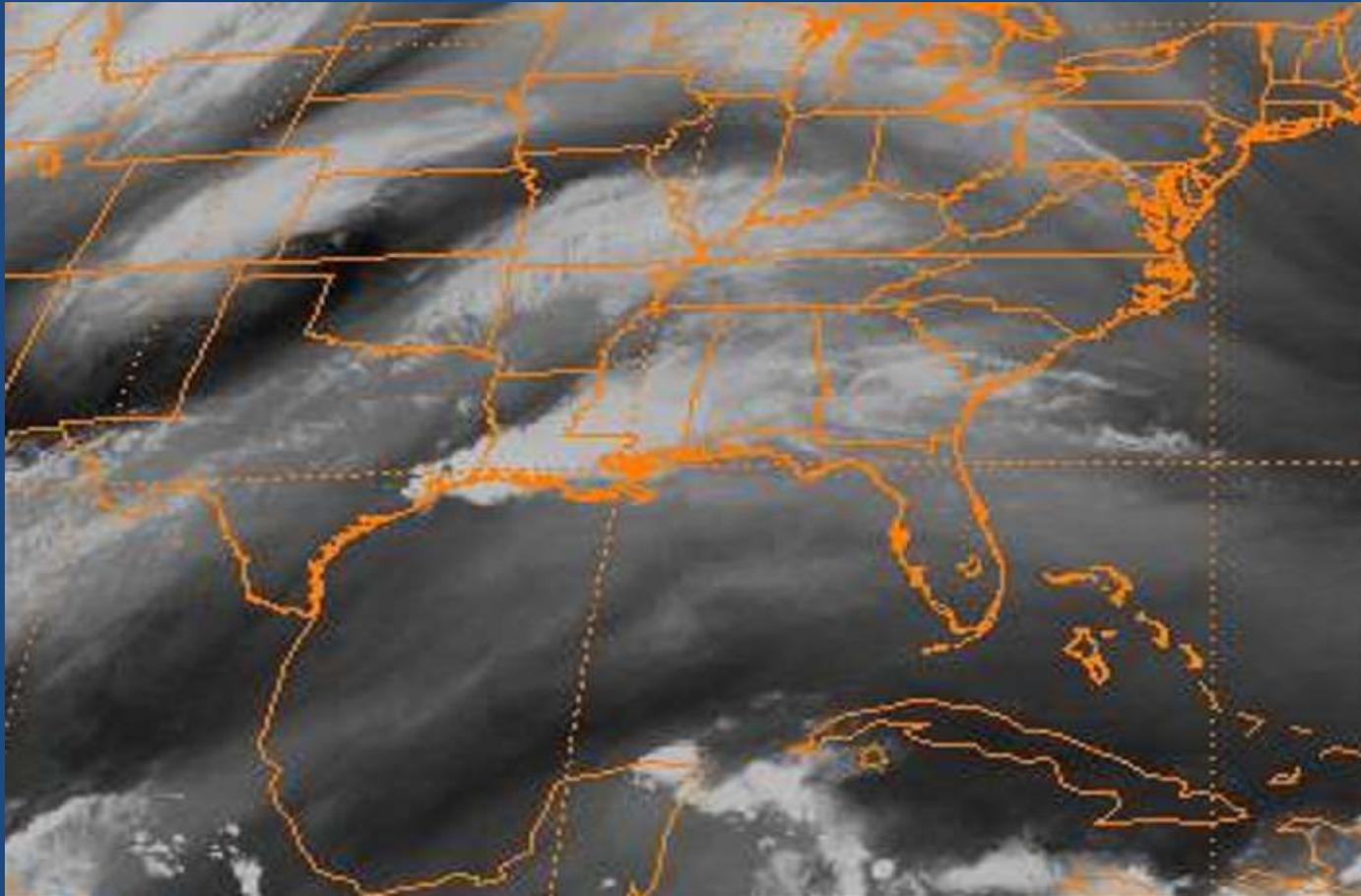


SKEW-T NWS LAKE CHARLES

SUNDAY MAY 25 12Z

SATELLITE DATA



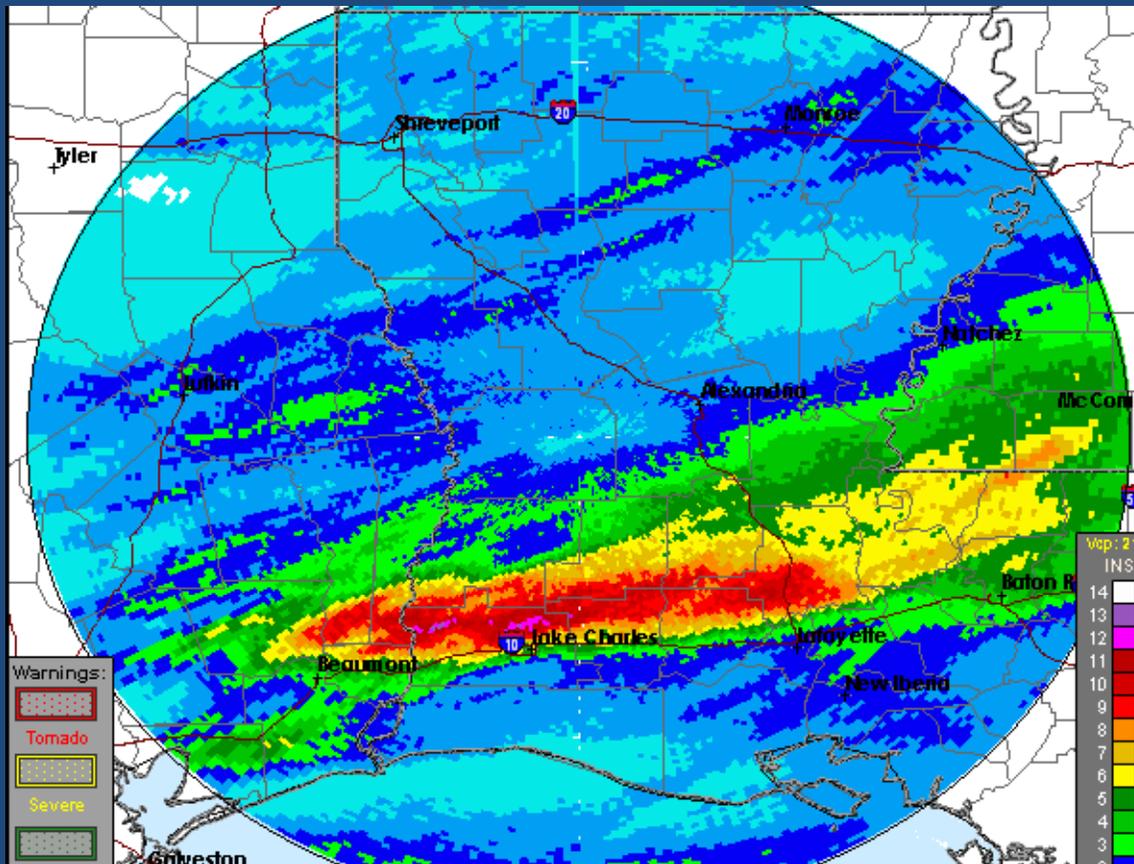


GOES 12 SATELLITE DATA

WATER VAPOR IMAGERY FROM
OCTOBER 26TH, 2006

WEATHER RADAR DATA





Storm Total Precip Estimates

From October 26-27th, 2006

NWS Web Storm Report (S. Shamburger)

SURFACE OBSERVATIONS

- **ASOS – Automated Surface Observing System**
- **CO-OP – Cooperative Volunteer Observers**
- **HADS – Hydrometeorological Automated Data System (USGS, USACE, NOS, etc...River and Rain Gauges)**
- **ALERT – Automated Local Evaluation in Real Time (Local Government Water Level and Rain Gauges)**
- **NOAA/GSD GPS-METEOROLOGY DATA - Ground Based GPS Satellite Radio Signals Measure Water Vapor**

USGS GAUGE LAKE MARTIN RD



USGS GAUGE SURREY STREET



USGS GAUGE BROUSSARD BRIDGE



AWIPS

- **Advanced Weather Interactive Processing System**
- **Gathers All The Data At A Workstation For The Meteorologists To Use**



AWIPS SATELLITE RECEIVER
RECEIVES THE WEATHER DATA



AWIPS WORKSTATION

**3 GRAPICAL SCREEN DISPLAYS AND
1 TEXT SCREEN DISPLAY**

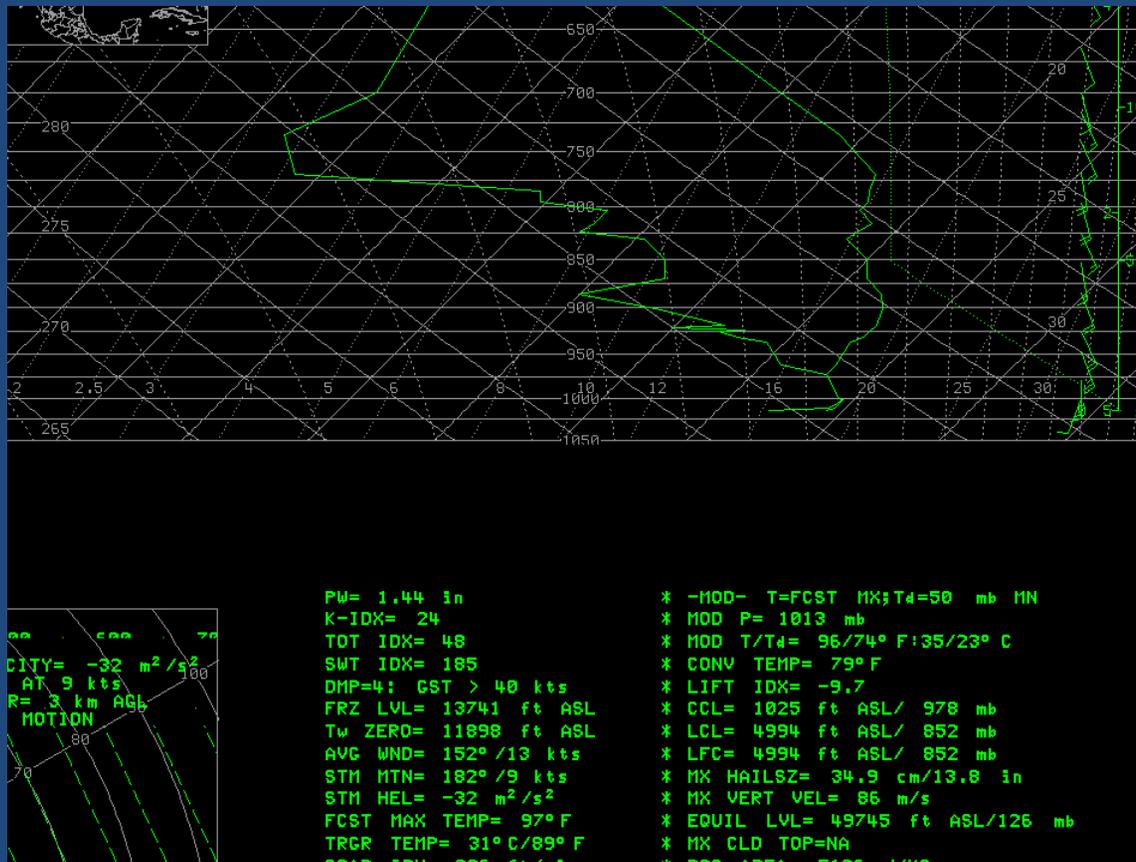
FORECASTING TECHNIQUES

MOIST ATMOSPHERE

- THE HIGHER CONTENT OF MOISTURE AVAILABLE...THE GREATER POTENTIAL FOR HIGHER RAINFALL AMOUNTS
- MOIST PLUMES ON WATER VAPOR
- PRECIPITABLE WATER VALUE

PRECIPITABLE WATER (PWAT)

- SIMPLE DEFINITION – AMOUNT OF WATER VAPOR IN A VERTICAL COLUMN OF AIR
- USED BEST WHEN COMPARED TO NORMAL VALUES
- HIGHER PWAT VALUE ABOVE NORMAL...GREATER CHANCE FOR HEAVY RAINFALL
- VALUE FROM SKEW-T OR GPS-MET



LCH SKEW-T MAY 25 12Z

PRECIPITABLE WATER = 1.44 INCHES

Lafayette, LA (station)

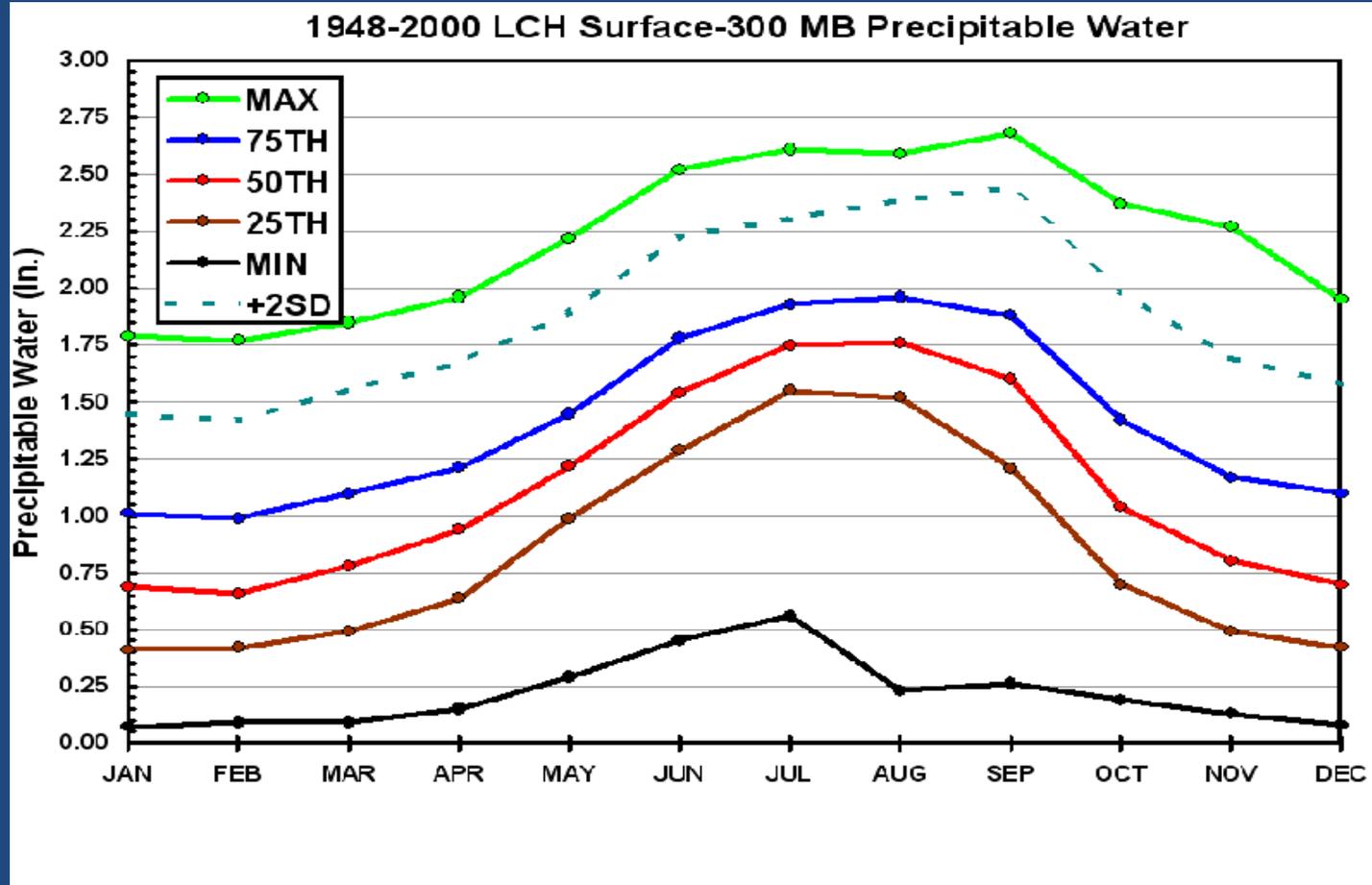
GOES IMAGERY AND PRODUCTS



GPS-MET DATA

LAFAYETTE MAY 22 – 27, 2008

PWAT OVER 2 INCHES ON MAY 22ND



PRECIPITABLE WATER NORMS

RED LINE – NORMAL

BLUE LINE – 150% OF NORMAL

DASH LINE- 2SD – FLASH FLOODING

UPPER LEVEL PATTERN

- UPPER LEVEL TROUGHS OR LOWS (USUALLY TO THE WEST) – ALLOWS FOR RISING AIR
- JET STREAKS THAT CAUSE DIVERGENCE AND ENHANCES THE LIFTING AIR

LOW LEVEL BOUNDARY

- PROVIDE A FOCUS FOR SHOWERS AND THUNDERSTORMS TO FORM AND MOVE ALONG
- SLOW MOVING OR STALLED SURFACE COLD/WARM FRONTS
- COLLIDING OUTFLOW (RAIN COOLED AIR) OR SEABREEZE BOUNDARIES

STORM MOVEMENT

- THE LONGER IT RAINS OVER ONE SPOT...RAINFALL TOTALS WILL BE GREATER
- THEREFORE...SLOWER MOVING STORMS WILL HAVE POTENTIAL TO PRODUCE HIGHER RAINFALL TOTALS...INCREASING FLOOD POTENTIAL

TROPICAL CYCLONES

- USUALLY CONTAIN A LOT OF MOISTURE
- OLD SCHOOL RULE OF THUMB...TAKE 100 AND DIVIDE BY THE MOTION OF THE TROPICAL CYCLONE TO GET RAINFALL ESTIMATE.
- FOR EXAMPLE...CYCLONE MOVING 10 MPH...
 $100/10 = 10$ INCHES

GROUND CONDITIONS

- WET OR SATURATED GROUNDS
- DRAINAGE DITCHES...CREEKS...AT FULL CAPACITY.
- HIGHER THAN NORMAL TIDES ALONG THE COAST NOT ALLOWING NORMAL RIVER FLOW INTO THE GULF (TIDAL BACK-UP)

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FFHLCH

HEADWATER GUIDANCE FOR HSA.....LAKE CHARLES LA

NATIONAL WEATHER SERVICE
LOWER MISSISSIPPI RIVER FORECAST CENTER, SLIDELL LA
225 PM CDT THU MAY 22 2008

INCHES OF RAINFALL FOR SPECIFIED DURATIONS REQUIRED TO PRODUCE
FLASH FLOODING IN HEADWATERS.

.B SIL 080522 Z DH18/DC0805221925 /DUE/PPHCF/PPTCF/PPQCF
:
:IDENT      1HR      3HR      6HR  HEADWATER NAME      STREAM
:=====  =====  =====  =====  =====
:
:.....LOUISIANA
:
VLSL1      2.0/  2.1/  2.3 :LAFYT/SURREY ST, LA  VERMILION R.
.END
$$

DUTY FORECASTER:  CALL LMRFC OPERATIONS

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FLASH FLOOD GUIDANCE

EXAMPLE OF PRODUCT FROM LMRFC OF
 RAINFALL AMOUNTS THAT MAY PRODUCE
 FLASH FLOODING

NWS HYDRO HAZARD PRODUCTS

HAZARDOUS WEATHER OUTLOOK – FORECASTER HIGHLIGHTS A GENERAL AREA FOR THE POTENTIAL OF HEAVY RAINFALL OR FLOODING UP TO 7 DAYS IN ADVANCE.

FLOOD WATCH – CONDITIONS ARE SUCH THAT FLOODING MAY OCCUR WITHIN 36 HOURS.

FLASH FLOOD WARNING - FLOODING IS IMMINENT OR OCCURRING. FLOODING WITHIN 6 HOURS OF CAUSATIVE EVENT.

FLOOD WARNING - RIVER FLOODING OCCURRING OR EXPECTED OR GEOGRAPHICAL AREA FLOODING IS EXPECTED TO OCCUR MORE THAN 6 HOURS AFTER THE CAUSATIVE EVENT.

FLOOD STATEMENT –

ISSUED TO UPDATE INFORMATION ON RIVER FLOODING.

OR

ISSUED IN SITUATIONS OF MINOR FLOODING OF STREETS OR QUICK INCREASES OF FLOW IN SMALL STREAMS THAT ARE NOT EXPECTED TO BE LIFE THREATENING. (URBAN AND SMALL STREAM FLOOD ADVISORY)

PRODUCT DISSEMINATION



NOAA WEATHER RADIO

SAME AND TONE ALERT WARNINGS

WXK-80 162.550 MHZ



NAWAS

**CONTACT LAFAYETTE 911,
LOUISIANA STATE POLICE, AND
LOUISIANA STATE EOC**

W00344 KLCH 2222Z
FLWLCH

BULLETIN - EAS ACTIVATION REQUESTED
FLOOD WARNING
NATIONAL WEATHER SERVICE LAKE CHARLES LA
526 PM CDT THU MAY 22 2008

...THE NATIONAL WEATHER SERVICE IN LAKE CHARLES HAS ISSUED A FLOOD
WARNING FOR THE FOLLOWING RIVERS IN LOUISIANA...

VERMILION RIVER AT LAFAYETTE, SURREY STREET GAGE

LAC055-113-231226-
/O.NEW.KLCH.FL.W.0038.080522T2226Z-080524T0324Z/
/VLSL1.1.ER.080522T2212Z.080523T0400Z.080523T1524Z.NO/
526 PM CDT THU MAY 22 2008

THE NATIONAL WEATHER SERVICE IN LAKE CHARLES HAS ISSUED A

- * FLOOD WARNING FOR
THE VERMILION RIVER AT LAFAYETTE, SURREY STREET GAGE.
- * UNTIL FRIDAY EVENING...OR UNTIL THE WARNING IS CANCELLED.
- * AT 5:15 PM THURSDAY THE STAGE WAS 10.1 FEET.
- * MINOR FLOODING IS OCCURRING AND MINOR FLOODING IS FORECAST.
- * VERY HEAVY RAINS OCCURRING AROUND LAFAYETTE WILL CAUSE RAPID RISES
ON THE VERMILION RIVER. THE FORECAST WILL CONTINUE TO BE REVISED
AS RAINFALL AMOUNTS ARE OBTAINED.
- * FLOOD STAGE IS 10.0 FEET.
- * IMPACT...AT 11.5 FEET...MINOR FLOODING OF BEAVER PARK AND
VERMILIONVILLE NEAR THE RIVER WILL OCCUR.

NOAA/NWS WEATHER WIRE

LOCAL MEDIA, PRIVATE WEATHER COMPANIES



Lake Charles, Louisiana

SR News

SRH Home

Organization

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Top News

- May 25-31, 2008 is Hurricane Preparedness Week
- NOAA has released its 2008 Atlantic Hurricane Season Outlook
- May 22, 2008 Flash Flooding & Severe Weather



Cell Phone Weather Link: www.srh.noaa.gov/wml

Click on the map for your Point Forecast (What is a Point forecast?)



More News

- May 15, 2008 Major Severe Weather Outbreak
- The 2008 SW LA/SE TX Hurricane & Marine Guide is now available
- Air Quality: Most messages began on May 15, 2008

National Weather Service • Since 1870

INTERNET WEBPAGE

www.srh.noaa.gov/lch

ahps.srh.noaa.gov/index.php?wfo=lch

IN CONCLUSION

- HEAVY RAINFALL EVENTS ARE NOT UNCOMMON IN THIS AREA
- NWS LAKE CHARLES USES VARIOUS TOOLS AND TECHNIQUES TO FORECAST THESE EVENTS
- NWS LAKE CHARLES ISSUES AND DISSEMINATES WARNINGS, WATCHES AND STATEMENTS TO PROTECT LIFE AND PROPERTY